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SPEECH

OF

MR. J. A. PEARCE, OF MARYLAND,

ON THE SUBJECT OF

THE COAST SURVEY OF THE UNITED STATES.

DELIVERED

IN THE SENATE OF THE U. S., ON SATURDAY, FEB. 17, 1849.

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SPEECH.

The Senate, as in Committee of the Whole, having proceeded to the consideration of the bill making appropriations for the civil and diplomatic expenses of the Government for the year ending June 30, 1850—

Mr. BENTON moved to strike out the clause appropriating $186,000 for defraying the expenses of the Coast Survey, including compensation to the superintendent and his assistants, and to insert in lieu thereof the following:

"For survey of the coast of the United States, the sum of $30,000; and from and after the 30th day of June, 1849, the said survey shall be carried on exclusively by the Navy Department, under the direction of the President of the United States."

Mr. BENTON having addressed the Senate in support of his amendment—

Mr. PEARCE said—

Mr. PRESIDENT: I differ widely from the Senator from Missouri. My views are altogether different from those which he has just presented. I believe that the United States Coast Survey, as it is now organized, as it is now carried on, has not grown up in defiance of any act of Congress. I believe it is in strict conformity with the original act of Congress authorizing the commencement of the Coast Survey, and with the subsequent act authorizing its continuance; strictly in conformity with the objects of that survey, as described generally in the laws authorizing it, and with the special objects which were left by those laws at the discretion of the President; strictly in conformity, not only with the interests of science, but with the great interests of commerce and navigation.

Sir, this work was due, not only to science, but to ourselves; due to that commerce which pours into our treasury nine-tenths of all its revenue, which you distribute in a thousand channels throughout the land; due to the navigation which conducts that commerce, and which furnishes us with the very best defences our country can have against foreign aggression. We know that the security of all the property invested in foreign commerce, and our coastwise commerce too, depends upon the accuracy with which that work is performed. We know that the lives of our mariners, who are constantly engaged in the most perilous of all occupations, likewise depend upon the accuracy with which that work is accomplished. And I believe that this work has been so conducted, that, while it has been in strict conformity with the law, it has advanced, in the very highest degree, the interests of commerce and navigation. Let us look at the law, and see whether it is so very limited in its object as the Senator from Missouri supposes. I find that the act of 1807 reads as follows:

"*Be it enacted, &c.*, That the President of the United States shall be and he is hereby authorized and requested to cause a survey to be taken of the coast of the United States, in which shall be designated the islands and shoals, with the roads or places of anchorage, within twenty leagues of any part of the shore of the United States; and also the respective courses and distances between the principal capes or headlands, together with *such other matters* as he may deem proper for completing an accurate chart of every part of the coast within the extent aforesaid."

This is the general designation of the objects of this survey. It is not limited to pointing out the islands and shoals which may exist within twenty leagues of the coast. It is not confined to the mere ascertainment of the principal capes and headlands, but it embraces all such other matters as the President, in his large discretion, may think should come within the proper scope of such a survey as this.

Again, by the third section of the act of 1807, the President was "authorized and requested to cause proper and intelligent persons to be employed to carry out any of the purposes of the act." He was not limited as to the number of persons to be employed. He was not restricted as to the character of the individuals, or the nature of their professions or pursuits. It mattered not whether they were astronomers, engineers, or otherwise. But, in the express language of the act, he is "authorized and requested, for any of the purposes aforesaid, to cause proper and intelligent persons to be employed, and also such public vessels in actual service as he may judge expedient, and to give such instructions for regulating their conduct as to him may appear proper, according to the tenor of this act." So much for the scope of that law as to the employment of persons to carry on this work.

But further: The act of 1832 revives the act of 1807, and authorizes the President of the United States, "in and about the execution of the said act, to use all maps, charts, books, instruments, and apparatus which now or hereafter may belong to the United States, and employ all persons in the land or naval service of the United States, and such *astronomers* and *other persons* as he shall deem proper."

The Senate will perceive that the very largest discretion is given to the President in regard to this matter, and it was rightly given. It would not have been proper for Congress to lay down the details of a plan for observations so delicate and so complicated as those necessary to the survey of the coast of the United States. That was wisely and properly left to the discretion of the President. And the President, in the exercise of that discretion, began by directing the Secretary of the Treasury to acquire the information necessary to the successful prosecution of the survey, and to consult highly distinguished scientific men throughout the country as to the plan upon which this important undertaking was to be pursued. The Secretary did so, and adopted the plan of a geodetic survey submitted by Mr. Hassler, subsequently sending him abroad to procure instruments for executing the work. This done, Mr. Hassler, when ready to commence the survey in 1816, was employed to conduct its operations under the designation of "superintendent." And, sir, the President departed from neither the letter nor the spirit of any law when he appointed a superintendent of the Coast Survey. A work of such import-

ance, magnitude, and delicacy, and of such a complicated character, could not have been conducted in any manner, much less conducted properly, unless under the supervision of one intelligent head, and that intelligent head must needs be "superintendent," no matter by what name designated. And Congress have recognised the propriety of this designation by their legislation. It is now a common term in the legislation of the country. And the term "Superintendent of the Coast Survey" has not "stolen" into the language of our statute books. It was brought in openly, properly, intelligently, and it would have been rather a matter of surprise than otherwise if that word had not been used by the Executive and by Congress too.

The act of Congress of March 3d, 1843, directed the reorganization of the mode of executing the survey, upon a plan to be recommended by a board designated in the law. This plan of reorganization was completed, according to the provisions of the law, before Mr. Bache became Superintendent; was submitted to and approved of by the President, and has furnished the general rules for the conduct of the survey; referring to the department charged with the survey the employment of the civilians engaged on them, the pay to be allowed them, and providing for filling vacancies occurring thereafter in the scientific department of the survey.

The Senator from Missouri seems to suppose that the sole object of the Coast Survey was what may be termed hydrographical, and he seems to think that, because such was its supposed object, the whole work comes peculiarly and solely within the province of the navy. Sir, I do not so understand it. I apprehend that the Congress which passed this law must have understood the general principles upon which great works like this have always been regulated in other countries. The letter of Mr. Gallatin to the individuals whom he consulted as to the plan for the Coast Survey, shows that he knew perfectly well what the language of science was upon this subject, and that in framing this plan, which has been carried out, and not departed from that day up to the present time, he was following out those rules which scientific men, acquainted with the subject, had decided to be the best for conducting such an operation.

Mr. President, the primary object of the Coast Survey is to make an accurate map on which shall be delineated the whole coast of the United States—not the principal capes and head-lands only, but the whole coast, with all its indentations and sinuosities, including those objects, whether on the shore or off the shore, the knowledge of which may be of any sort of value to navigation. This is a work which cannot be done either by ordinary land surveying or by ordinary off-shore surveying. It is a work of the highest science. It requires the very best ability, the most complete and refined observations, the use of the most delicate instruments, the nicest and most complex calculations—

astronomical as well as ordinary trigonometrical calculations. The processes by which the latitude and longitude of any point on the earth's surface are calculated are the very nicest of all the processes known to science—processes, perhaps, not perfectly completed at this day. And I may say of the Coast Survey under Mr. Bache—as indeed when under Mr. Hassler—that it has not only kept up with all the inventions and improvements of science in other countries, but it has surpassed them. The learned and able gentlemen engaged in prosecuting this work have made discoveries of their own, have invented new instruments, new processes, by which more precise results are arrived at in the various scientific calculations connected with their undertaking; and many of their inventions and discoveries have attracted the notice and won the admiration of the scientific world, and will render our country illustrious for all time. To delineate accurately the coast of the United States, according to the opinion of all scientific and practical men, requires, as I have said, the highest scientific and practical abilities; for this, though a practical, is not a plain business, as the Senator from Missouri assumes. It is not a business which can be performed by every officer of the navy, or by one-tenth, or by one-twentieth part of the officers of the navy, if I know any thing of their abilities for such a work. I know many of them who are no more competent to perform this work than I am myself, and I am utterly incompetent. I know very few naval officers who are competent for this business, and those few have been trained and rendered competent by their labors in this service, under the present accomplished and efficient Superintendent of the Coast Survey and his learned predecessor. The profession of the naval officer does not require the profound scientific education which these duties demand, and that period of life usually devoted to such studies is passed by them in acquiring *nautical* knowledge. From sixteen to twenty-two, when the foundation of this knowledge is laid with all professional men, they are commonly on the ocean, without the means of, or the leisure for, this scientific training. Therefore, though there are many gallant and generally intelligent men among our naval officers, it is not to be wondered at that they do not furnish the kind or degree of acquirement requisite for the higher operations of the Coast Survey. There are some brilliant exceptions to this general rule, but they are only exceptions.

In the army there is necessarily more mathematical and astronomical science, and it has been availed of in the Coast Survey, which, indeed, has been a capital school for the further improvement of our young officers.

In relation to the navy, as well as the army, I may say, that they have not been idle, even since the war with Mexico has been brought to a close. Large and increasing demands are made upon them for the protection of our commerce in every part of the world; and I think that the leisure allowed them is

nothing more than a reasonable relief from the common hardships and perils of their profession.

There are very few whose attention has been drawn to the operations of this survey, and perhaps it may be well to give some explanation of the process.

The operation begins with a series of *triangulations*, so called, by fixing upon a number of prominent points on the coast, some of them at large distances, and connecting these points by trigonometrical operations upon a large scale. It is then necessary to include in the first another series of secondary and tertiary triangles, correcting and verifying the whole by astronomical observations of the greatest nicety.

The Senator from Missouri seems to suppose that the Superintendent of the Coast Survey has violated the law by establishing an observatory for the purpose of making astronomical observations. Not at all. Every astronomical observation that has been made by the Superintendent has been necessary for the determination of the latitude and longitude of places or points of the survey which it was requisite to have fixed and precisely known. Sir, I scarcely think it needful to give the Senate any authority for these statements, but I can easily do so. I will read a paragraph from an article in the "Princeton Review," written by Professor Henry, one of the most distinguished savans of this or any other country:

"Connected with the primary triangulation a series of astronomical observations are made for ascertaining the latitude and longitude of the principal points, the result of which may serve to check the triangulation, and establish on the chart the parallels of latitude and meridians of longitude. Such a survey is susceptible of great accuracy, and possesses within itself the data for its own verification." "It might appear at first sight that the process here described is one of no great difficulty of execution, and that it may be safely trusted to men of ordinary scientific acquirements, &c., but nothing can be further from the truth."

Sir, a minute error in your base line—a small mistake in any of your primary observations—propagates and multiplies itself throughout the whole extent of a work of this sort.

So that the astronomical observations which it has been supposed might convert the Coast Survey into a permanent national observatory, are nothing more than the necessary instruments for giving precision and value to the result of the surveys made in the prosecution of this work. This is well known. It is the practice in every civilized country under heaven, where any attempt has been made to execute a grand work like this. The great survey of England is both trigonometrical and astronomical. So is the great survey of France. So are those of Wurtemburg, of Prussia, of Russia, of Italy, and other countries, many of which have been executed with extraordinary fidelity and accuracy, but not one of which is superior, in any respect, to that in which we are now engaged. We have improved upon their means in some particulars, and our surveys are inferior in accuracy, completeness of detail, and economy of performance, to none in the world. A National Observatory has grown up here since the passage of the act of 1832, but it has grown up under different aus-

pices from those of the Coast Survey. It has been legally established by an act of Congress, by the co-operation of the two branches of the Legislative and Executive, and it has no connexion with the Coast Survey. If, at any time, an observation has been made at the National Observatory for the benefit of the Coast Survey, it has been but a proper and incidental contribution from that establishment towards the accomplishment of this great national work. Sir, I venture to say that it never entered the mind of Mr. Bache or Mr. Hassler that, in prosecuting those observations absolutely necessary to the success of the undertaking in which they were engaged, they were running in conflict with any act of Congress requiring that the Coast Survey should not establish a permanent astronomical observatory. The Superintendent of the Coast Survey would have been disgraced as a scientific man, and a faithless public servant, if he had omitted to give accuracy, precision, and value to his work, by such indispensable and well known means as are and must be employed in all works of this character.

But to return to the manner in which these operations are conducted. After the main triangulations and the secondary and tertiary triangulations, comes the topography, which delineates the country for a few miles inland. Mr. Hassler carried it much further inland than Mr. Bache has done. That was partly owing, however, to the fact of the great difference in the character of the country upon which the two officers were engaged. Mr. Hassler was occupied chiefly with the hilly regions of the North, where there were many prominent natural objects, far inland, which furnished the best points for his triangulations. His observations were, therefore, necessarily carried further into the interior than those of Mr. Bache, who, besides a considerable amount of work at the North, has been much occupied with the southern portions of our country, where the land is lower and more level, and where Mr. Hassler never carried his operations.

While, then, they are making this primary triangulation, this secondary triangulation, which is subsidiary to the former, and this tertiary triangulation, to assist in the completion and verification of the whole, they might just as well make a topographical map of the country. They might have omitted that, to be sure; but I think that it was discretionary with the President to include this work, since, while engaged in the Coast Survey, it would make but a very little addition to the expense to make a topographical map of the coast, instead of a mere skeleton map of the different stations and triangulations. Besides, an important part of this topography is to furnish the shore line necessary to the hydrography of the coast. It is by ascertaining the precise position, as to latitude and longitude, of all the points upon the coast, that you arrive at an accurate delineation of the shore lines upon that coast. That is not all. The hydrography cannot be ascertained with any precision without the aid of shore operations. It is necessary to make triangulations with points

upon the coast, with which to connect the points off the coast, in order to mark down and describe the soundings. The system of triangulation is just as necessary, in order to enable you to delineate upon a map the character of the surface of the earth under the ocean, as to enable you to delineate the objects upon the surface of the earth upon the shore; so that trigonometrical and astronomical observations are absolutely necessary for this survey, and are, in fact, the basis of it.

Sir, we have had detached surveys, made at different times, of different parts of the coast—hydrographical surveys; and I venture to say not a single one of them has been accurate, but most of them have been, in the highest degree, inaccurate. I know this to be a fact. I know, for example, thatt he hydrographical surveys off New Bedford and Buzzard's Bay have been exceedingly incorrect, and that by the operation of this precise system under which the Coast Survey has been prosecuted, we have discovered the greatest dangers to navigation lying directly in the track of vessels on their way to that port—a port which owns three hundred whale ships. Dangerous sunken rocks, with but five feet water on them, have been discovered lying almost directly in the channel. The discovery of these sunken rocks by the Coast Survey may, in the course of time, save to this country more than the whole expense of the Coast Survey. A great deal has been saved by this discovery to citizens, and a great deal to the Government, for the Government very often loses more duties by the wreck of vessels in one year than the whole of the annual expense of the Coast Survey.

To ascertain and delineate the topography of the surface underneath the waters, to some distance from the shore, with the same precision with which you describe the surface of the shore, is a very important matter, sir. Navigation cannot be secure without it. The navigator who approaches your coast in thick weather, or in a cloudy night, when he cannot take observations of the heavens, and when too far out to see the lights, must depend upon his soundings for his position. Various modes have been pursued to furnish the character of the bottom, not only in the bays and sounds, but upon the sea and near the shore, and as far out as the sounding line can ordinarily reach. The common method is by means of a greased lead, which brings up a specimen of the deposites on the bottom.* These are accurately examined and described, and their character and depth, and their relations to points on the shore, which have been previously determined by scientific observations, are carefully marked on the charts.

It is desirable, then, to give not only the topography of the shore, but also the exact character or topography of the bottom of the sea on our coast within reach of soundings. Thus, and thus only, can navigation be made safe.

* A valuable invention of Lieutenant Stellwagen, of the U. S. Navy, by means of which specimens of the bottom are brought up in sufficient quantities for preservation, is used on the Coast Survey.

Now, sir, the results of that Coast Survey have already been of extreme value. The discovery of a deep and direct channel over the outer bars of the harbor of New York, never before used or known, has proved of immense importance to the commerce of that great commercial city. It has earned the gratitude of the merchants of that city, and elicited testimonials of the highest approbation from the chamber of commerce and other public bodies. The navigation of Delaware bay has been vastly improved by it. A new straight channel, parallel to the old one, has been found in this bay, better sheltered from floating ice. Three channels were found over what are called the Cape May Ridges, which will be vastly serviceable to the coasting vessels of the coal trade—a business which sends from Philadelphia annually nine thousand cargoes of coal to various parts of the coast. The whole form of the bottom of the bay has been ascertained to have been inaccurately given heretofore. Some dangerous shoals—on which wrecks have frequently taken place—have been discovered to be miles out of place on the old maps. Other supposed ones are shown not to exist. The width of the bay has been found to be less at certain points than heretofore described, by several miles, and the position of important points has been corrected. In the case of a light-house the error was some six or seven miles. For example, the position of the light-house at Bombay Hook, on the lower part of the bay, in a neighborhood noted for the number of vessels grounded there, has been found to have been erroneously assigned on the old charts by a distance of six or seven miles.

Off the shores of Nantucket a number of shoals have been discovered by Lieut. Davis, and have since been surveyed, which were wholly unknown before. They lie directly in the track of vessels from New York to Europe, from all the southern coast to several of the New England States, and from these latter to the West Indies, and are and will continue to be very serious dangers to navigation until the mariner shall be warned from them by proper beacons or other means.

Very great improvements have also been made in the navigation of Chesapeake bay. Many dangerous shoals have been discovered, by these precise operations, in that bay, which were never before known to exist; and who can tell what amount of property, and how many valuable lives might have been swallowed up in that bay but for these discoveries? Great and similar improvements have been made also in the navigation of Long Island sound, Massachusetts bay, &c. New channels have been discovered, and hidden dangers, not before known, have been pointed out.

These are some of the direct and practical benefits resulting from the operations of the Coast Survey, which will soon be extended to all the coasts of the United States. No such benefits, I venture to say, could have resulted, or ever will result, from a system different from that which we are now pursuing.

One important feature of this system, one which has been successfully car-

ried out in the progress of its investigations, is the union of the officers of the army and navy, and of civilians, for the better prosecution of the work.

Officers of the navy are now exclusively employed in the hydrography. They have not been unceremoniously set aside, nor have they been thrust out of employment for which they were fit. They are the only men who have been employed in the hydrographical department of the Coast Survey. Officers of the army have been employed on the shore work when they could be obtained, and both have rendered excellent service in this combined system of operations. Only three of the army, I think, are now employed upon the survey. Prior to the war with Mexico eleven of them were so employed. Applications are now pending, as I know, for more of them to be employed in the same service.

The combination of army and navy officers and civilians is precisely the mode of all foreign countries, except Great Britain.

In Great Britain the trigonometrical survey is confined to the ordnance branch of the military service. That is not exactly such a survey as ours. It is a geodetic survey of the whole kingdom, and the hydrographical part is comparatively limited; and is, besides, not intended, I believe, to be complete and continuous as ours will be. The surveys of that description are detached, particular parts of the coast only being surveyed and delineated, in which respect it resembles the great survey of France.

The great object of the English survey is to describe the whole interior of the kingdom. I do not know how many officers there may be employed in this, or how many vessels they may engage. Their hydrographical operations are by no means so extensive as those of the United States. They have no such extent of coast, sir, as we have; a coast of 30 000 miles, exclusive of our new possessions on the Pacific coast; and we have innumerable rivers, besides the bays and sounds. When I say 30,000 miles, I mean to count the sinuosities, of course. That is the estimate. We have a vastly more extended coast than that of Great Britain. There is a great deal more to be done. Besides, a great deal of their coast is unapproachable, and they survey only such portions as may be approached. They began in 1783, with an intention to connect, by trigonometrical observations, the observatory at Greenwich with that at Paris. In 1791 the government undertook a general survey, under the direction of their board of ordnance. We know how abundantly liberal their appropriations have been, and yet, sir, that service is going on to this day, and is not likely to be completed for some time to come. It has cost money far beyond any thing which the Coast Survey of the United States has cost. They have appropriated more than seven millions of dollars, exclusive of other large sums spent in the general hydrographical operations, to which the Senator has alluded, in the fifty-eight years during which it has been in progress. Since

1825 the annual appropriations have varied from $250,000 to $500,000 per annum.* How many officers they employ I do not know, but I know that they have a corps of sappers, amounting to three hundred and fifteen men, specially organized for the service. And it is well known that the military service of Great Britain is organized upon so large a scale that they have much greater range of selection than we have among the much larger number of scientific officers in their army.

Besides the seven millions already expended, the appropriations necessary to complete their survey have been reported at about $1,500,000; so that to finish it they will require a sum equal to the whole amount already expended by us in our Coast Survey; and it will be remembered that these additional demands are necessary to complete a plan which has been in operation for 58 years.

We have already, in 17 years, accomplished a large part of our Coast Survey; much of the primary and other triangulations of the topography and hydrography—not all of it connected, to be sure; but upon the scale of appropriation asked for, the whole may be completed in 15 years.

Plans have been adopted by the present Superintendent to prosecute the work more rapidly. He has divided the whole Atlantic and Gulf coast into nine sections, and parties are at work on all these sections, in eighteen different States of the Union. Though the work on these different sections will be separately conducted, the whole will finally be connected, so as to form one continuous series of observations and surveys, and to make the work a unit. The work in one part will verify that in another, and a general, minute, and accurate survey of our whole coast will be the result.

Now, sir, the expenses of this coast survey, so far, have been, I believe, about a million and a half of dollars; of which the sum expended in Mr. Hassler's time was $766,000, and that in Mr. Bache's time $579,000. Mr. Bache now has on hand nearly $150,000, in vessels, instruments, equipments, engraving apparatus, &c , and, deducting the cost of such of these as were purchased during his superintendence from the gross sum spent by him, we have about $500,000 as the aggregate expenditure for all other purposes during his five

* *Abstract of the aggregate amount paid in each year, on account of the survey of counties and the trigonometrical surveys, since the year* 1832 *up to January,* 1847.

Year.	Total.			Year.	Total.		
	L.	*s.*	*d.*		*L.*	*s.*	*d.*
1832–'3	44,329	17	3	1840–'1	84,039	4	11¾
1833–'4	42,528	14	2	1841–'2	84,365	11	11
1834–'5	50,856	5	7	1842–'3	93,147	11	1¼
1835–'6	56,404	14	5	1843–'4	77,402	9	1
1836–'7	66,447	4	9	1844–'5	65,428	2	4
1837–'8	80,149	16	6	1845–'6	57,311	19	5½
1838–'9	79,918	4	5	Up to January 1847	44,155	13	11½
1839–'40	79,681	8	0½				

years. For this sum he has accomplished more than was done with much larger expenditure in Mr. Hassler's time.

Now, sir, it is very true that the appropriations have been increased largely since Mr. Hassler commenced the work, but it is equally true that the results have increased in a much larger proportion, and that greater accuracy as well as rapidity of execution is demonstrable.

I take no notice of the work done prior to the suspension of the survey in 1819; because that was very little in amount. But I compare the work done by Mr. Hassler, from 1832 to 1844, with that done by Mr. Bache from 1844 to 1849. Mr. Hassler's reconnoisances in twelve years covered 18,103 square miles. Mr. Bache's in five years cover 22,544 square miles.

Mr. Hassler's triangulation in twelve years covered 14,483 square miles. Mr. Bache's extended over an area of 19,309 square miles. The hydrography in Mr. Hassler's time spread over an area of 9,632 square miles, a little more than half of which was off-shore; that of Mr. Bache covered 15,086 square miles, of which three-fourths was off-shore work.

Mr. Hassler's soundings were 808,147. Mr. Bache's 950,202. Mr. Hassler's engraved plates of maps were five; Mr. Bache's twenty-four. None were published by Mr. Hassler; but twenty-one have been published by Mr. Bache, and 7,678 printed sheets of maps have been distributed in his time, and not one during Mr. Hassler's.

The comparison continues the same throughout almost all the items of the tabular statement from which I draw this information.

The only particulars in which Mr. Hassler's work exceeds that of Mr. Bache are in the amount of topography and shore line, and the number of original topographical maps. It will be observed that the amount of Mr. Bache's topography is, in proportion to the time employed, larger than Mr. Hassler's. It is absolutely less, because Mr. Bache designedly reduced the amount—not considering it necessary to prosecute these surveys so far inland, and because, in this way, the expense might be lessened; of course the number of original maps would be necessarily less. The shore line, of which I now speak, is that which includes the rivers, as well as the sea, bay, and sound coast; and it will be perceived that the amount of this under Mr. Bache is two-fifths of the whole, although his time is less than one-third of the whole time.

Thus it appears that the work done by Mr. Hassler was far more limited in its amount than that performed by Mr. Bache. I do not say this as a matter of reproach to Mr. Hassler; far from it. He had the difficulties of the early organization to surmount, and, during the first half of his superintendence, smaller annual appropriations were made by Congress. He had also to educate for the service some of these very persons who now seek to destroy the progress and prosperity of the work. But I wish to show that while the

appropriations have been increased when Mr. Bache has had the superintendence, the work which has been done has increased in a greater proportion. The work is advancing much more satisfactorily, and will accomplish much sooner its great object—that is, the security of the commerce and lives of the citizens of the United States. Almost all discoveries in science are so connected that it is scarcely possible to prosecute the necessary operations of the Coast Survey without advancing incidentally the interests of science on matters not of themselves indispensable to the work. But who will venture to object to that, when this grand object is accomplished? The further expense will be a mere nothing; and when it is in the power of the President to allow it or disallow it, he must of course be supposed to have allowed it, if he has not expressly disapproved.

The Senator from Missouri seems to think that this will subject the army and navy to the command of the Treasury Department, instead of the President of the United States; that it would subject, and had subjected, the army and navy to the command of the Secretary of the Treasury. Why, I apprehend that the Secretary of War never dreamed of any such results. I venture to say there is not a single instance in which any officer of the army or navy has been subjected to the command of the Secretary of the Treasury by virtue of the introduction of these words into the act to which the Senator has referred. The Secretary of the Treasury has never dreamed of taking any authority into his hands over the army or navy of the United States on account of this phrase. He has never called upon one of them to do any service connected with this survey, without the express assent and direction of the Secretaries of War and Navy. It depends upon them, and not upon the Secretary of the Treasury, whether those officers shall be ordered into the service of the Coast Survey or not. It is so with the men; it is so with the vessels of the navy. At this very time an application is pending before the Secretary of War for more officers of the army for this very service.

Now, sir, the Senator stated that there were thirteen vessels employed in our Coast Survey, whereas there were only ten employed in the British hydrography.

Mr. Benton. Before a certain day.

Mr. Pearce. Be it so. Now, sir, these thirteen vessels—are they an excess or not? That is the question. As I said before, we have the coast divided into nine different sections, in which the work is all going on at the same time. It is necessary to have a considerable number of vessels to carry on all these operations in the different sections, and execute the work properly and efficiently. They are not only necessary for the hydrographic part of the work, but it is necessary to have small vessels connected with the service for the topographical and triangulating parties. Some of those vessels are so employed to my own certain knowledge, for I have seen them in the Chesapeake bay.

They are used not merely for the purpose of carrying on the hydrographical operations, but to furnish lodgings for officers and men. In the sickly regions it would not be safe for the parties to sleep in tents upon the marshy shores. It is the experience which the officers of the Coast Survey have had in this which induced them to ask for these vessels. They obtained them, and they do not camp on shore by night; they do not sleep on those low shores, subject to the miasma and the vapors, but on board of their vessels. They found this to be not only more healthful, but very economical. Besides, in thinly settled parts of the coast, they must carry all their supplies in this way; and, indeed, the vessels are necessary sometimes to carry them from one point to another, where a passage is only practicable by water.

Now, sir, in regard to the vessels obtained, and the circumstances under which they have been obtained. Some of these vessels have been turned over to them from the revenue service. A steam vessel, for instance, was built several years ago, at great expense, without authority of Congress. Gentlemen will remember the complaint of this in Mr. Tyler's time—the passage of a bill to prevent it in future, which was vetoed by the President, and passed, in spite of his veto, by two-thirds of both Houses. Two of these vessels, one of which cost $120,000, were found utterly unfit for the use of the navy or revenue service. This vessel was not fast enough for a revenue cutter, and was vastly more expensive than sailing vessels, and was not a good sea-boat. When one of them returned from Mexico to New Orleans, it was advertised to be sold at auction, and $3,000 only was bid for it. The officer having charge of it would not complete the sale at that price, and informed the Secretary of the Treasury, who directed it to be converted into a light-boat. Another steamer liable to the same objections was transferred by the Department to the Coast Survey. As the operations of the Coast Survey do not require very rapid movements, nor oblige vessels to put out far to sea, this vessel answers her present purpose pretty well. Such has been the case with another one.

The Senator says that the additional expense of this little fleet, not charged to the Coast Survey, is about $210,000 per annum—making the proposed expense of the next year about $400,000. But this is a mistake. These vessels are sailed or steamed out of the Coast Survey appropriation. The men, of all but those used in the hydrography, are also paid from the same fund. The officers and men of seven of them are furnished by the navy; and the Secretary of that Department, in a report recently sent in, states that their whole expense for five years is $193,000, or at the rate of $38,600 per year. So that the Senator's calculation is entirely at fault.

Now, it is asked that an appropriation should be made at the rate of $186,000 per annum, and that is thought to be enormous. Well, it is certainly larger than the amount appropriated in Mr. Hassler's time, which in his last year was $100,000. The Senate will recollect that we are increasing the force. In fact,

you are getting the work done sooner, better, and cheaper, by making appropriations to have it carried on upon a proper scale. The plan, progress, and economy of the Coast Survey, have received the approval of every scientific man of any note in the country, and of the Department. I have before me the testimony of learned societies and of learned men, and I find one single sentiment to pervade them all.

The Superintendent, sir, is not always in the field, it is true. He cannot always be in the field, but he is in the field for eight months in the year, conducting and superintending the observations—always, when in the field, making astronomical and geodetic observations himself. Indeed, whenever there is any difficult process to be carried out, such as measuring a base line, for which purpose his ingenious apparatus has commanded the admiration of the scientific world, he always personally attends to it. But he cannot be in all the points of the survey at once. In the neighborhood where he is, he always makes all the more important observations himself. It is true that he has a number of assistants. But the scale upon which his plans are pursued, and which I may say has received the approval not only of the President of the United States but of Congress, requires all the assistants allowed him. The specific details of all their work are regulated by instructions directly from him. Mr. Bache has furnished every year a full account of his operations to the Department and Congress. He has concealed nothing.

He is not only a man of profound scientific ability, disciplined in the severest school of study known in the United States, but he has matured and improved his earlier acquisitions since his arrival at manhood by the most diligent research, perseveringly pursued at home and carefully prosecuted abroad, and indeed by every means known to the philosophic scholar. To all this ability and acquirement he adds a simplicity of character which becomes the philosopher, which not only sheds a grace upon him, but secures for him the fullest confidence of all who know him.

Such a man could not and would not conceal any thing from Congress and the public; and, accordingly, he has developed in the fullest manner, and to the minutest point, all his plans and operations. With a full knowledge, therefore, of all they could desire to know, Congress has made the appropriations asked for, and has thus sanctioned the manner, the means, and the extent of the Coast Survey as conducted at the present time.

I think a work so interesting to science as this, so incalculably valuable to the country, so honorable to the Superintendent, his assistants, and all concerned, should not be changed or checked, more especially in this manner.

I trust that the old exploded system of detached and imperfect surveys will not be resumed. That system has uniformly ended in disappointment and failure, and the present is the only one worthy of Congress and the country.